


AWARD/CONTRACT		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)		RATING		PAGE OF PAGES 1 3	
2. CONTRACT (Proc. Inst. Ident.) NO. EP-C-17-031/68HERC21F0008				3. EFFECTIVE DATE See Block 20C		4. REQUISITION/PURCHASE REQUEST/PROJECT NO. PR-ORD-20-01477	
5. ISSUED BY CODE CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001		6. ADMINISTERED BY (If other than Item 5) CODE					
7. NAME AND ADDRESS OF CONTRACTOR (No., street, country, State and ZIP Code) TETRA TECH, INC. Attn: John Hochheimer 10306 EATON PL STE 340 FAIRFAX VA 22030				8. DELIVERY <input type="checkbox"/> FOB ORIGIN <input checked="" type="checkbox"/> OTHER (See below)			
				9. DISCOUNT FOR PROMPT PAYMENT			
				10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN		ITEM	
CODE 198549560		FACILITY CODE					
11. SHIP TO/MARK FOR CODE ORD CIN Office of Research and Development US Environmental Protection Agency 26 West Martin Luther King Drive Cincinnati OH 45268		12. PAYMENT WILL BE MADE BY CODE					
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 U.S.C. 2304 (c) () <input checked="" type="checkbox"/> 41 U.S.C. 3304 (a) ()				14. ACCOUNTING AND APPROPRIATION DATA See Schedule			
15A. ITEM NO	15B. SUPPLIES/SERVICES			15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
	Continued						
15G. TOTAL AMOUNT OF CONTRACT						\$147,587.00	

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CONTRACTING OFFICER WILL COMPLETE ITEM 17 (SEALED-BID OR NEGOTIATED PROCUREMENT) OR 18 (SEALED-BID PROCUREMENT) AS APPLICABLE			
17. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return 0 copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)		18. <input type="checkbox"/> SEALED-BID AWARD (Contractor is not required to sign this document.) Your bid on Solicitation Number 68HERC20R0146 , including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your bid, and (b) this award/contract. No further contractual document is necessary. (Block 18 should be checked only when awarding a sealed-bid contract.)	
		20A. NAME OF CONTRACTING OFFICER Andrea Dehne	
19B. NAME OF CONTRACTOR		19C. DATE SIGNED	
BY (Signature of person authorized to sign)		20B. UNITED STATES OF AMERICA BY  ELECTRONIC SIGNATURE (Signature of the Contracting Officer)	
		20C. DATE SIGNED 10/08/2020	

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED EP-C-17-031/68HERC21F0008	PAGE	OF
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NAME OF OFFEROR OR CONTRACTOR

TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
0001	<p>DUNS Number: 198549560</p> <p>Task Order award incorporates the attached EPA blanket administrative modification signed by Raoul Scott on August 11, 2020. All other terms and conditions remain unchanged. Contractor is aware of the action consolidation.</p> <p>TOCOR: Susan Cormier Max Expire Date: 04/07/2022</p> <p>Period of Performance: 10/08/2020 to 04/07/2022</p> <p>Firm Fixed Price</p> <p>BASE PERIOD: Task Order Issuance Line Item: Technical Support for EPA/ORD Ecological Assessment Programs</p> <p>Delivery: 10/07/2021</p> <p>Accounting Info: 20-21-C-26A6000-000FK7XR4-2532-26A6A-2026A6E040-001 1 BFY: 20 EFY: 21 Fund: C Budget Org: 26A6000 Program (PRC): 000FK7XR4 Budget (BOC): 2532 Cost: 26A6A DCN - Line ID: 2026A6E040-001 Funding Flag: Complete Funded: \$0.00</p> <p>Accounting Info: 20-21-C-26A6000-000FK7XR4-2532-26A6F-2026A6E040-002 2 BFY: 20 EFY: 21 Fund: C Budget Org: 26A6000 Program (PRC): 000FK7XR4 Budget (BOC): 2532 Cost: 26A6F DCN - Line ID: 2026A6E040-002 Funding Flag: Complete Funded: \$12,611.00</p> <p>Accounting Info: 20-21-C-26A6000-000FK7XR4-2532-26A6A-2026A6E040-003 3 BFY: 20 EFY: 21 Fund: C Budget Org: 26A6000 Program (PRC): 000FK7XR4 Budget (BOC): 2532 Cost: 26A6A DCN - Line ID: 2026A6E040-003 Funding Flag: Complete Funded: \$134,976.00</p>				147,587.00
0002	<p>OPTION PERIOD: Task Order Issuance Line Item: Technical Support for EPA/ORD Ecological Assessment Programs (Option Line Item)</p> <p>10/01/2021</p> <p>Delivery: 04/07/2022</p> <p>Award Type: Firm-fixed-price</p> <p>Delivery-Invoice Payment Schedule shall not exceed a frequency greater than once a month and 90% of the task order price. Acceptance for Continued ...</p>				31,155.00

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	invoicing is based on deliverable approval by the TOCOR. For efficient processing IAW FAR clause 52.232-32, performance based payment invoicing amounts will not be submitted until the TOCOR provides deliverable approval. The TOCOR will notify Tetra Tech within 14 days of submission of a deliverable of EPAs intention to approve or disapprove. TOCOR: Susan Cormier/(513)569-7995/cormier.susan@epa.gov ALTOCOR: Michael Griffith/(513)569-7034/Griffith.michael@epa.gov				

PERFORMANCE WORK STATEMENT

Tetra Tech, Inc.
Contract EP-C-17-031
#PR-ORD-20-01477
Task Order: 68HERC21F0008
SOL 68HERC20R0146 Amendment #1

TITLE: Analytics for Aquatic Research

Task Order Contracting Officer Representative (TOCOR) Name: Susan Cormier, Ph.D. Office: ORD, CEMM, USEPA 26 W. M. L. King Drive Cincinnati, OH 45268 Phone: 513-569-7995 (voice) FAX: 513-569-2540 (fax) Email: cormier.susan@epa.gov (email)	Alternate Task Order Contracting Officer Representative (Alt. TOCOR) Name: Michael Griffith, Ph.D. Office: ORD, CEMM, USEPA 26 W. M. L. King Drive Cincinnati, OH 45268 Phone: 513-569-7034 (voice) Email: Griffith.michael@epa.gov
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PERIOD OF PERFORMANCE: Base Period: 12 months from date of Task Order (TO) award
Option Period 1: 6 months from end of base period award

PURPOSE OF TASK ORDER

The primary objective of this task order is to develop new methods for estimating background environmental conditions and relationships between stressors and aquatic life. Related to these efforts is the effort to better predict how background affects the assimilative capacity of water and how watersheds respond to natural and man-made influences. The success of this effort will be based on the ability of EPA personnel to understand and repeat developed analyses using the open source program R, ArcGIS, and Microsoft as described in Task 4 and the crafting of manuscripts and other publicly available materials that report the research details of the development process for the field-based methods. Work on these projects began in 2007 and continues to advance the science. Therefore, the second objective of the Task Order is to continue to provide greater transparency and accessibility of the supporting analyses used to produce all methods developed as a part of the Task Order and those begun on earlier related Task Orders.

BACKGROUND

The US Environmental Protection Agency's (EPA) Office of Research and Development (ORD), Center for Environmental Measurement and Modeling (CEMM) develops, evaluates, and

applies measurements and models to characterize the sources, occurrence, transformation, transport and effects of pollutants and stressors in the natural environment. This work provides fundamental methods and models required to implement environmental statutes. CEMM research also identifies approaches and tools to inform effective management of water/airsheds and ecosystems. These efforts inform human and ecological exposure, health, and risk assessments. To fulfill this mission, CEMM scientists collaborate and partner within and outside of ORD to deliver solutions-driven research that is responsive and impactful.

Research products from CEMM is used by states, tribes, businesses, non-government agencies, EPA's program and regional office managers who use the information for making planning, regulatory, enforcement, and remedial-action decisions. CEMM is committed to developing methods using field observations and models to enable decision making to adapt to changes in water quantity and quality. To fulfill this mission, CEMM requires the expertise and support as described in the contract Performance Work Statement (PWS).

Water quality and quantity is affected by natural and man-made situations, such as, hydrologic permanence affected by drought or water removal, land-cover alteration by fire or urban development, and direct and indirect loadings by weathering, run-off, or waste discharges. The more we understand the processes that affect water quality and quantity, the better positioned we are to minimize or adapt to changing conditions and societal needs. This Task Order supports work to estimate natural background water quality and quantity. It also supports research to characterize causal relationships between sources of change and changes to water quality and quantity. These causal relationships may be used to evaluate stream condition, to assess agents and sources, to predict changing conditions, and to evaluate how decisions have or have not influenced water quality and quantity.

QUALITY ASSURANCE

The tasks in this Task Order require the use of existing data and use of modeling tools for data analysis. The Contractor shall prepare a Quality Assurance Project Plan (QAPP). All QA activities shall be in conformance with this QAPP. Documentation of all analyses shall also indicate how types, quantity, and quality of data have been quality assured and maintained. In addition, the contractor shall ensure that metadata is compiled in an easy to use format. All products should be detailed so that the decisions and analysis are completely transparent to a third party. The Contractor shall alert the TOCOR regarding any quality issues should they arise. Any project specific quality assurance issues shall be reported in the monthly progress reports as specified under Task 1. The QA activities for this Task Order should comprise at least 10% of the total effort. Also see Section 5, Quality Assurance in Contract PWS.

SCOPE OF WORK

The purpose of this Task Order is to obtain contractor services to address new or modified analyses to advance the use of field data for characterizing stressor response relationships and

support tools to enable states, tribes and other assessors to readily use these methods. The specific tasks are defined below. Written exchanges for Technical Exchange will be provided to the contractor for clarification purposes provided by the EPA TOCOR. Any verbal technical collaboration exchange shall be provided to the CL-COR/CO in writing within 3 days.

Task 1: Establish Communication and Prepare Reporting Schedule

The Contractor shall establish communication with the EPA TOCOR and develop a regular reporting schedule. The Contractor shall contact the EPA TOCOR and schedule a kickoff project meeting. In discussion with the EPA TOCOR the Contractor shall also establish a schedule for regular progress reports, project meetings, and other communications throughout the period of performance of this Task Order. Topics of discussion will include roles and responsibilities, points of contact and documentation protocols, timelines, QAPP, milestones and deliverables, and other Task Order administrative activities.

This task requires coordination with other EPA offices and federal and state agencies. The Contractor shall notify the EPA TOCOR of issues, problems, questions, or delays which may be anticipated or as soon as they become apparent. The EPA TOCOR may modify the frequency of conference calls based on project progress. From EPA TOCOR may invite researchers from other federal agencies to provide perspectives and information. Also see Section 2, Task Area 6, Support Communication of Products and Information in Contract PWS.

Task 1. Deliverables

1.1	Brief, written progress reports as email to the EPA TOCOR		Due monthly or upon request by the EPA TOCOR for the duration of this Task Order.
1.2	Project meetings summaries and other communications, such as conference calls		Due three days after the meeting

Task 2: Prepare and Implement QAPP

The Contractor shall review, update and submit for approval the previously approved QAPP for Task Order 6 (B-CIN-0030155 within 30 days after TO award. The EPA TOCOR and the EPA QA Manager will review and approve any changes. Changes to the existing QAPP shall include updates to personnel, changes to the approach and measures the Contractor will implement to ensure a high standard of quality in data analysis and written deliverables. The Contractor shall not proceed with tasks needing QA review until the EPA TOCOR notifies the contractor that the QAPP have been accepted by EPA.

All QA activities shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5) <https://www.epa.gov/quality/guidance-quality-assurance-project-plansepa-gag-5> and should demonstrate a clear understanding of the project's goals/objectives/questions and issues. Documentation of all analyses shall also indicate how types, quantity, and quality of data have been quality assured and maintained. In particular, the quality assurance shall also ensure that metadata is compiled in an easy to use format accessible to EPA as described in Tasks 3 and 4. All products should be detailed so that the decisions and analysis are completely transparent to a third party. The Contractor shall notify the TOCOR of any quality issues that develop. Also see Section 5, Quality Assurance in Contract PWS.

Task 2. Deliverables

2.1	Updated existing QAPP or QAPP extension memo submitted to the EPA TOCOR and QA Manager for review.		Due 30 days after Task Order award
2.2	A final updated QAPP submitted to the EPA TOCOR for approval.		Due 1 week after EPA TOCOR approval of Deliverable 2.1

Task 3: Develop methods and analyze case examples

The contractor shall develop and refine methods to support field-based methods for condition, causal, predictive and outcome assessments. The contractor shall also use case examples to characterize the confidence and uncertainties in predictions using these developed methods and models. Due to the true research nature that will be performed under this Task Order, EPA TOCOR may request additional analyses or modifications of existing analyses per Technical Exchange (TE). The specific analyses to be performed are dependent on the status of completion of construction of database being constructed under Task Order 68HE0C18F0892 Amendment 2 of EP-C-17-031. The TOCOR will describe needed tasks at the kick-off meeting and follow with a written summary of the status of the product and technical discussions as needed and as described in Tasks 3.1 and 3.2.

It is anticipated that work will include methods to assess stream water quality and quantity at the reach scale. It is also expected that detailed examples of water quality, quantity, and biological effects will be performed at the watershed or national scale.

The contractor shall prepare scientific products appropriate for each basic or advanced analysis. These may include but are not limited to power point presentations, manuscripts, reports, HTML web material, R-code or SAS-code modules, Excel modules, data sets and metadata for publication, data dictionaries, CADDIS website updates, ESRI Story Maps, and GitHub ready

code and data sets. The contractor may be required to obtain additional data from third party sources such as state or federal entities. Also see Section 2 in Contract PWS, Task Area 2: Manage Data and Information, Task Area 4: Task Area 5: Develop and Enhance Information Technology Tools and Applications Conduct Data Analyses and Modeling.

Task 3.1: Statistical analyses, Database construction, Report sections (Basic) These include routine activities such as: writing up methods, performing QA check on databases, obtaining databases, querying data bases, and frequentist analyses such as but not limited to descriptive statistics (e.g., mean, median, centiles, etc.), correlation analysis, box plots, contingency tables, and analyses such as conversion of units, and running regression models. These activities take between 1 to 8 hours. In the base ~~year~~ period, about ~~30~~ 34 basic analyses are anticipated for Task 3.1 and will be initiated by written technical exchanges from the TOCOR. For Option Period 1, another 6 basic analyses are anticipated for Task 3.1.

Task 3.1 Deliverables

3.1	Description of proposed analytical method for each analysis		Within 5 business days after completion of analyses
3.2	Interim analytical results		Usually within 5 business days
3.3	Description of methods, data sets and all product outputs		Within 20 business days of completion of analysis

Task 3.2: Complex statistical analyses, spatial analysis, model development (Advanced) These activities require more sophisticated skills and synthesis of disparate information. The verification of analyses and validation of models adds complexity that increases time needed to perform the work. These activities are expected to take between 3-5 working days. The QA and metadata pedigree (Task 4) should include the basic analyses that led to or contributed to the more complex analysis, see Task 3.1. This will reduce redundancy of reporting data sources, R-code and related scientific work. In the base, about ~~25~~ 27 advanced analyses are expected for Task 3.2 and will be initiated by written technical exchanges from the TOCOR. In Option Period 1, another 5 advanced analyses are anticipated for Task 3.2.

Task 3.2 Deliverables

3.2.1	Description of proposed analytical method for each analysis		Within 5 business days after completion of analyses
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3.2.2	Interim analytical results		Usually within 20 business days, but may be longer for very complex analyses or models
3.2.3	Description of methods, data sets and all product outputs		Within 20 business days of completion of analysis

Task 4: Provide Metadata

The Contractor shall provide complete metadata for all manipulations of datasets, documentation of all figures, tables, and analyses performed in conjunction with the development of the reports including all appendices and supporting analyses such as validation of models and predicted values. Datasets and corresponding data dictionaries used for all the analyses shall be provided as flat files (e.g., tab, or comma-delimited) as well as a data dictionary. Files shall be sorted into logical folders such as R-codes, SAS-codes, Arc-GIS codes, excel work sheets, data sets, figures, tables, text and all other materials related to the generation of maps, statistical analysis and numeric outputs, etc. The metadata will be linked to a table of contents. The open source R-code shall be split into separate preprocessing and analytic functions. The EPA TOCOR will provide the Contractor with an example of a completed data pedigree to use.

The Contractor shall use EPA TOCOR approved open source software "R" for statistical analyses unless otherwise specified. Annotated code and data sets should be retained and submitted when providing results. Results and figures should be provided as code for the statistical package language that was used and provided as ppt, pdf, eps or other image software approved by the EPA TOCOR. Formulae for fitted lines should be provided. All final images should be a minimum of 300 dpi, whereas figures for publication should be 500 dpi or greater.

Any spatial analysis, that is, the use of Geographic Information System (GIS) tools, functions, geoprocessing, and operations (e.g. map overlay, spatial query) of geographically-referenced data, shall include either a flow chart or model-builder steps that depict the data management and analysis of the GIS layers. If any scripts are used in the GIS analysis, those scripts should be annotated, retained, and submitted when providing results. Any maps produced from a GIS system shall include the source information of the data shown in the map and map projection, which may be in Adobe PDF files or ESRI format as dictated by technical exchange. FGDC compliant metadata will be developed for any newly developed GIS datasets for use with this tool.

After the construction of the metadata pedigree, the Contractor shall test the final product by having non-development personnel rerun all scripts. Also see Section 2 in Contract PWS, Task Area 2: Manage Data and Information.

Task 4. Deliverables

4.1	Metadata of analyses	Within 30 business days after completion of analyses
4.2	Complete QA and metadata pedigree	At the completion of Task 3.2

Technical Expertise Required for Key Contractor Staff:

The key technical individual(s) must have experience with development of physical, chemical and aquatic life exposure-response relationships including toxic (e.g. organics and metals) and naturally occurring stressors (e.g., minerals, sediment, nutrients) and varied aquatic life (e.g., algae, invertebrates, fish). This work requires biostatistics (particularly R and SAS and writing and reviewing code), understanding of water chemistry as it relates to non-conventional pollutants and effects on aquatic life, and the relevant body of literature.

Deliverables and Schedule

<i>Task 1. Communication Deliverables</i>		
1.1	Brief, written progress reports as email to the EPA TOCOR	Due monthly or upon request by the EPA TOCOR for the duration of this Task Order.
1.2	Project meetings and other communications, such as conference calls,	Due upon request by the EPA TOCOR for the duration of this Task Order.
<i>Task 2. QA Deliverables</i>		
2.1	Draft QAPP submitted to the EPA TOCOR and QA Manager for review.	30 days after Task Order award
2.2	Revised QAPP addressing EPA TOCOR comments on the draft submitted to the EPA TOCOR for approval.	Due 1 week after EPA TOCOR approval of Deliverable 2.1.
<i>Task 3.1. Analytical Deliverables (30 Basic)</i>		
3.1.1	Description of proposed analytical method for each analysis	Within 5 business days after completion of analysis
3.1.2	Interim analytical results	Usually within 5 business days

3.1.3	Description of methods, data sets and all product outputs	Within 20 business days of completion of analysis
<i>Task 3.2. Analytical Deliverables (25 Advanced)</i>		
3.2.1	Description of proposed analytical method for each analysis	Within 5 business days after completion of analyses
3.2.2	Interim analytical results	Usually within 20 business days, but may be longer for very complex analyses or models
3.2.3	Description of methods, data sets and all product outputs	Within 20 business days of completion of analysis
<i>Task 4. Documentation Deliverables</i>		
4.1	Metadata of analyses	Due within 30 business days after completion of analyses
4.2	Complete QA and metadata pedigree	Due at the completion of Task 3.2

ACCEPTANCE CRITERIA

The Contractor shall prepare high quality products and that are reproducible and transparent. Figures submitted shall be of high quality similar to presentations developed for national scientific forums and should be formatted as jpeg or TIFF files. Text deliverables shall be provided in Microsoft Word 2010 or compatible format.